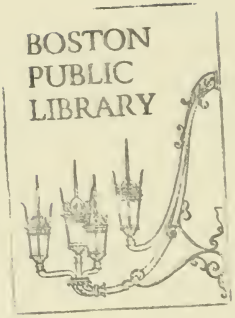
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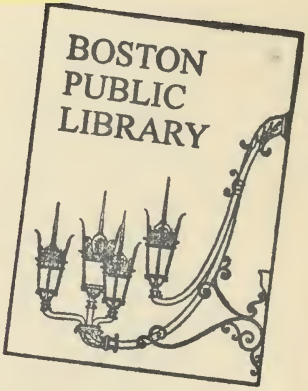

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I PROJECT DESCRIPTION

The South Station Transportation Project has been established by the Massachusetts Bay Transportation Authority (MBTA), the Boston Redevelopment Authority (BRA) and the Executive Office of Transportation and Construction (EOTC) to redevelop the South Station area as an intermodal terminal in conjunction with the Federal Railway Administration (FRA). FRA's interest is reconstruction of tracks and platforms, rehabilitation of the basement, surface and second floor levels of the South Station headhouse, and provision of parking for 500 cars on a first air-rights level above the tracks, all as part of its Northeast Corridor Improvement Project (NECIP).

The City of Boston and Commonwealth of Massachusetts' interests are relocation of presently poorly located and inadequate intercity and commuter bus facilities in this area in a 54-bay terminal on the second air-rights level above the tracks, including convenient access ramps, and parking for 1,500 additional cars on the third, fourth, and fifth air-rights levels above the tracks.

The MBTA's interests are modernization of its Red Line subway station serving the South Station including platform lengthening and a direct passageway/ escalators connection into the railroad/bus terminal, and construction of a Commuter Rail Maintenance Facility in the area.

Private interests are development of the third, fourth, and fifth floors of headhouse for office rental space and walkway between bus terminal, parking and headhouse for retail space. The MBTA has been designated developer of entire site by the Boston Redevelopment Authority and is completing acquisition of the total property from the BRA.

II OVERVIEW OF AFFECTED ENVIRONMENT

South Station is on the southeastern edge of the downtown Boston central business district, just south of the financial district and one-half mile from City Hall. South Boston, to the south and east of the station, is a mixed residential and industrial area. Immediately to the west is the industrial Leather District and the mixed commercial and residential neighborhood of Chinatown lies beyond.

The station is located at Dewey Square, the intersection of Atlantic Avenue and Summer Street. The project area is bounded on the east by the Stone and Webster building, the U. S. South Postal Annex, and the Fort Point Channel and on the west by Atlantic Avenue and the Massachusetts Turnpike Authority ramps.

III JUSTIFICATION FOR ACTION

The Boston Redevelopment Authority (BRA), Executive Office of Transportation and Construction (EOTC), and the MBTA have focused their attention to the concept of consolidating all the various types of transportation services into a single building complex which would combine intercity and commuter rail service; intercity, commuter and local bus service connections with rapid transit. South Station is the location for such a transportation center since rail service to the south and west now exists there; highway access to Boston's Central Artery and the Massachusetts Turnpike is convenient; rapid transit is adjacent to the station.

Project Elements

Northern Terminus of the NECIP

An important element of the Federal Railway Administration's program will be the renovation and general improvements to the stations in the corridor. With South Station as the northern terminus of the NEC, it is highly desirable that the station become a more functional and attractive facility capable of handling the anticipated increases in rail patronage which will occur as a result of

the NECIP railroad improvements.

Headhouse

The five-story South Station headhouse, which is architecturally valuable and listed as a Nationally Historic Landmark, will be rescued from its presently seriously deteriorated condition. An emergency work program has been initiated under interim capital improvements to address the most serious problems of deterioration, which exist in the roof, drainage systems, windows, electrical hazards in basement and attic and the concourse roofing. The program does not commit any agency to perform further work on the station.

The proposed project will build upon these stop-gap measures, rehabilitating the first and second floors of the headhouse to provide passenger services and a variety of retail outlets. The third, fourth and fifth floors will be converted into office space. A service tunnel has been proposed between the service area and the basement. The addition of the service tunnel will avoid any conflict between passengers and service carts.

Concourse

Behind the headhouse is the single-story concourse area. The station once extended from Dorchester Avenue to Dewey Square to the Atlantic-Kneeland intersection. Skylights running parallel to the tracks were once an important architectural feature of the concourse. Now, the roof structure is dilapidated, and the skylights have been allowed to deteriorate beyond repair. Extending south of the concourse, the platform roof structures are also in disrepair, and provide little weather protection.

The southern side of the building is in poor condition and contributes to the image of decay that has prevailed in the area. The rebuilding of the concourse and track area should help dispel this negative image.

Tracks

The tracks and platforms are inadequate in several ways. The usable track heads are far off to one side of the headhouse and do not connect conveniently to the concourse area, which currently opens directly onto unused portions of the train yard. The tracks and platforms are not long enough to accommodate the 12-car trains planned for future Amtrak and MBTA operations. The existing low platforms, which require a climb up into cars, are unsafe, inconvenient, and a barrier to the handicapped. The interlocking, which is the system of track switches which permits the trains to move into position at the platforms, is worn out; consequently, frequent maintenance is required.

The proposed project will correct these inadequate and unsafe conditions. It will also construct a parking facility with a capacity of approximately 500 cars on the air rights above the track and platform area.

Bus Terminal

The South Station Transportation Center's location provides easy accessibility, to Boston's major highway access routes; namely, the Massachusetts Turnpike to the west and the Central Artery to the north and south. Because of the accessibility commuter bus carriers from the north will now be able to provide service to and from the central part of the city. Commuter buses from the south are presently located at South Station while the two major bus terminals servicing intercity and commuter buses are presently located at Park Square which provides a poor location and inadequate facilities.

Maintenance Facility

The suitability of a new Commuter Rail Maintenance Facility at South Station is significant due to the more complete and rapid turnabout time it will provide for daily and monthly inspections and running repair. The present decentralized facilities are not efficient because of time involvement. It will also deliver the quality of service needed to avoid negotiation of warranties for new rolling stock.

Red Line Station Modernization

Major modernization, including platform lengthening toward both the north and south is scheduled for the South Station Red Line Rapid Transit Station. The station will receive new circulation elements such as entrances, elevators, and escalators, new graphics, new interior finishes, and facilities such as collection, A. C. service, lighting, acoustic treatment, ventilation facilities, and other user amenities. A major element in the program will be a connector between the rapid transit station and the South Station headhouse.

FUTURE DEVELOPMENT

Garage: An addition of three levels of parking would add 1,800 cars to the garage. The additional parking will fill the need of the Dewey Square area, as well as any future need for parking required for a new arena. The responsibility to bring this about rests with the Boston Redevelopment Authority.

West Wing Addition: An addition to the west wing of the headhouse along Atlantic Avenue would bring the building facade to its original symmetry. This addition would be independent of the air-rights development and will add additional office space and retail area to the project.

IV SOCIO-ECONOMIC/LAND USE IMPACTS

Social Impacts

While many urban projects have substantial impacts on social environments, the South Station project is not likely to have a significant social impact. There are no residential neighborhoods and only very few residential units in the immediate station vicinity. Thus, no direct neighborhood social impacts will occur. The project area is a social environment during business hours, however, and the station itself has had a negative impact on the area because of its deterioriated condition. Any level of improvement will help to dispel this negative effect. New development that is transportation-related, office, or hotel will be compatible with existing uses and will reinforce the existing social functions in the project area. No residential disruption or relocation will occur.

The anticipated social impacts of the South Station improvement project would be primarily beneficial, including increased efficiency of the transportation terminal functions, as upgraded image for the historic headhouse, and improved accessibility to police, fire, museums, shopping areas, and other services in the city. No adverse social effects are predicted.

Economic Impacts

Overall, the business climate in the South Station area would be enhanced by the urban design and traffic flow elements as well as by predicted increases in intercity rail ridership and commuter rail. These types of changes are already occurring in the South Station area as a result of private and public investment decisions. It is projected that 35,000 persons a day will pass through South Station. This impressive figure and the investment of Urban Initiative Funds will stimulate the investment of private funds into the project.

The project is designed to encourage private investment and thus maximize rental income in the headhouse and concourse. Retail and concession space will be located on the first and second floor levels as well as the pedestrian passageways and Red Line transit connection. The upper three floors of the headhouse will be rehabilitated into office space by either a private developer or public agency.

The bus facilities are also expected to be a major source of revenue to the project. Each of the carriers will negotiate rental arrangements with the MBTA for their proportionate use of the terminal. The MBTA, acting as a private landlord, will provide all the support services needed to operate these facilities. The cost of these services will be taken from the revenue received.

An in-lieu-of-tax payment will be made to the City of Boston by the private bus carriers using the facilities and the tenants of the headhouse. The actual tax payment will be negotiated with the city as part of their rental agreements.

It is anticipated that the development of the bus terminal and headhouse will lead to the private investment of a west wing addition to the headhouse.

The project would result in increases in concession and retail employment as well as in permanent Amtrak employment there. Commuter rail employment would also increase, primarily as the result of system-wide commuter rail improvements. No significant adverse impacts to local businesses are anticipated, although short-term construction disruption may necessitate relocating some of the concourse concessions.

South Station along with its centralized location in Boston is also located in an area of important development opportunity on the recently revitalized fringe of the central business district.

Land Use Impacts

The South Station Urban Renewal Plan, which was approved in 1968-9 by city agencies, set forth an image for improvement of the South Station/Dewey Square environment. The plan recommended various new land uses for the area, many of which have been realized. Recently completed redevelopment efforts in the urban renewal area include the Fiduciary Trust Bank building, the Stone and Webster office building and, most recently, the Federal Reserve Bank. The ongoing renovation of the South Postal Annex is in the process of being completed this year. With the exception of a development parcel to the west of South Station and certain street improvement actions, most of the urban renewal activity has already taken place. The major remaining element is the intermodal transportation component envisioned for South Station.

Since the project will both renovate the deteriorating South Station structure and improve transportation service in the area, the land use impacts would be largely positive. In relation to the broader land use context of downtown Boston as a whole, the project would have an overall positive impact, since it would improve the rail transportation service which is essential to the downtown. Further, the project would shift the concentration of bus service from Park Square to South Station. Also, the project would have an effect on the distribution of parking downtown, since the spaces provided at South Station will not add to the overall supply, but will result in the elimination of an equal number of existing spaces as required by the City's parking freeze regulations. Thus, some parking lots will be freed for other uses, or left vacant.

The improved transportation facility would also bring into focus the vacant parcel to the west of South Station. The proposed BRA Dewey Square building may either be a hotel or an office building rounding out the South Station Urban Renewal Plan.

Stone and Webster Corporation plans to construct a plaza on the land it owns adjacent to South Station. The Transportation Center plans would necessitate a taking of a small portion of this land. The program for the plaza is being determined by Stone and Webster in coordination with the ongoing development of South Station plans.

Also, the program for the service area located between South Station, the Postal Annex, and the south side of the Stone and Webster building is still being resolved. The existing service area is much smaller than the space which would be available with the construction of the new track design. The possibility of satisfying Stone and Webster's need for parking for handicapped persons in this

area is being investigated.

Fort Point Channel is a potential open space resource which is little utilized since access and visibility are limited, and since its water is heavily polluted. In addition to encouraging development of the warehouse district to the southeast of the Channel, the BRA has proposed landscaping and water quality improvements. Very little can be done to create a direct relationship between the station and the channel because the Stone and Webster and Postal Annex buildings intervene.

V TRANSPORTATION AND CIRCULATION IMPACTS

Most of the vehicular traffic in the South Station-Dewey Square area is not related to the rail activities at South Station. Increases in rail patronage are expected to produce only a marginal increase in associated traffic. However, significant impacts will occur in the immediate vicinity of the station because of the addition of bus and automobile parking.

The intensive development proposed will have the effect of diverting some traffic to the South Station area from other parts of the downtown. Thus, while localized traffic impacts may be adverse, impacts on the overall affected environment, i.e., the downtown, could be positive if significant numbers of vehicles are diverted to the project area and away from the narrow downtown streets. This is particularly likely because the downtown parking freeze requires that parking spaces added at South Station replace existing downtown spaces. These existing spaces currently draw traffic into more congested sections of the downtown area and would be eliminated if parking facilities were built at South Station.

Existing Conditions

Seventy percent of intercity rail passengers at South Station are expected to walk or use local transit to and from the Station; 28 percent are dropped-off or picked-up by auto or taxi, and only two percent park long-term. Virtually all commuter rail passengers walk or use local transit to and from South Station. Rail passengers generate only 150 vehicle trips per peak hour, representing less than five percent of the traffic on Summer Street and Atlantic Avenue at the station. Since most rail passengers use transit, walk or are dropped off or picked up by taxi or private auto, there has previously been no need to create off-street parking specifically for rail use.

Peak hour traffic operations are congested but acceptable at two nearby intersections, with average levels-of-service of C- or D:

1. Dewey Square intersection
2. Kneeland Street at Turnpike Expressway entrance area.

Levels-of-service on some streets are periodically worse than C- or D during the peak; in particular, extensive queues often develop on Summer Street. Heavy traffic at Dewey Square also conflicts with large pedestrian movements to and from the headhouse.

Future Trends

The predicted patronage increase by 1990 for intercity rail with NECIP is 79 percent, compared to 32 percent without NECIP and an increase in commuter rail passengers of 38 percent by 1990. The projected increase in bus passengers for the same period is 60 percent.

Because a parking freeze is in effect in the downtown Boston area, no net increase in parking spaces will be permitted. BRA plans to locate new parking (including the FRA parking deck) at the South Station site are based on the condition that such spaces will replace spaces that currently exist in other parts of the downtown. A permit from the BAPCC will be needed in order to begin construction of any parking. This permit can only be granted if there are enough spaces available in the downtown parking "bank." However, South Station is considered a priority location for parking and the City is willing to close other lots it owns to help make these spaces available.

The following changes to the street system are expected to occur:

1982: Summer Street and Dewey Square realigned; Auto Restricted Zone (ARZ) implemented in September, 1978; southbound connector closed between Summer Street and Atlantic Avenue at Dewey Square.

1990: New ramp from turnpike to Kneeland Street; reversal of existing turnpike ramp; South Street becomes southbound; Atlantic Avenue becomes northbound; Essex Street widened and made two-way; Surface Artery closed north of Essex Street; South Street realigned with Purchase Street; ramp closed from Surface Artery to Central Artery; possible relocation of the northbound Central Artery.

Without the South Station Project the level-of-service at the two critical intersections would be no worse in 1990 than at present, but it would worsen to D or D- in the interim years before construction of the new turnpike ramp and changes to the street directions; the level-of-service at the Atlantic/Congress

Street intersection would worsen to C- following the closure of the ramp from Surface Artery to Central Artery.

MBTA express buses would be relocated to Atlantic Avenue and South Street following implementation of the ARZ and other street changes.

The Trailways terminal will be required to relocate by early 1979 due to development of Park Square. An interim site has been selected above the Central Artery, north of Dewey Square.

VI AIR QUALITY IMPACTS

The major potential for operational air quality impacts at South Station would result from use of the proposed parking garage and increased traffic volumes generated by growth in patronage. Further impacts could result from inclusion of a bus station in the parking structure and the traffic it would generate. Since this could cause an increase in the carbon monoxide (CO) levels at receptor locations in the immediate vicinity of the station, the air quality analysis identified a study area based on projected growth of station traffic, determined the locations of reasonable receptors, and calculated the existing and future levels of CO at these receptor points for each alternative. The analysis used existing monitoring data from permanent sites in the area to define existing air quality and to estimate background concentrations.

The results of the predictive modeling analysis indicate that the one-hour CO standard would not be violated in 1982 or 1990. Eight-hour concentrations under the worst assumptions would violate the standard. These predicted violations result from the heavy traffic congestion, and poor level of service at key intersections in the South Station area. The high concentrations predicted for a "do-nothing" alternative at virtually all receptor locations precludes

compliance with the eight-hour standard by the development project.

Three additional air-quality issues have not been fully evaluated in this analysis because the station design is still in a preliminary design stage. There are: the air-quality impact of the proposed bus station, the impacts of the diesel exhaust for trains in the platform area which will be directly below the air rights agrage and essentially enclosed,and the impacts of venting this locomotive and bus exhaust on critical receptors in the area around the station.

Meteorology

The Boston area typically experiences a mean summer temperature of 70°F and a winter mean of 31°F, with a mean annual temperature of 51°F. Essentially at sea level, the Boston area receives 42 inches of precipitation distributed fairly evenly over the year. The dominant winter winds are from the Northwest at about 14 mph while summer winds from the Southwest average about 11 mph. A brisk afternoon sea breeze is common on sunny summer days. The area experiences a significant number of winter storms and a few in summer.

Air Quality

In 1976 and 1977, the ambient air quality in the Boston area was monitored by the State of Massachusetts' Department of Environmental Quality Engineering at seven locations (Figure 1). The data (Table 1) indicate that total suspended particulates (TSP) and the automobile related pollutants, carbon monoxide (CO) and ozone, are a major problem in the Boston area. Both the annual and 24-hour TSP primary standards were violated at two locations in 1976 and one in 1977. The eight-hour CO standard was violated at all sites in both years. At the single ozone monitoring site the one-hour standard was violated in both years.

Data for oxides of sulfur (SO_x) and oxides of nitrogen (NO_x) show no violations.

In summary, the monitoring results indicate that the Boston area is characteristic of most each coast urban areas. The TSP levels are a problem, and improvements in short-term emissions are warranted. The automobile related pollutants are a significant problem despite increasingly more stringent exhaust emission controls. The local air quality in the immediate vicinity of South Station can be expected to be similar to monitored levels for TSP and ozone since these are areawide rather than site specific pollutant problems. Carbon monoxide levels are probably similar to the monitored levels since the main streets in the station area are heavily traveled.

METHODOLOGY

Modelling Techniques. The CO impact at any given receptor location is dependent on two sources. There is a general background concentration, resulting from sources of CO other than the adjacent streets,and there is the CO caused by the traffic in the streets adjacent to the receptor location. An estimate of the background CO concentration can be made using continuous one and eight-hour data from permanent monitoring stations within or nearby the study area. CO impacts caused by local street traffic were estimated using the screening techniques for evaluating proposed indirect sources outlined in EPA's "Volume 9." [1]

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[1] Guidelines for Air Quality Maintenance Planning and Analysis, Volume 9: Evaluating Indirect Sources, U.S. Environmental Protection AGency, January 1975.

The Volume 9 approach utilizes known or predicted traffic volumes and street characteristics, such as road capacity, signalization of intersections and other constraints which cause congestion, in the "HIWAY"[2] line source model. Vehicle emission factors for Volume 9 modeling were calculated using EPA's "AP-42" Supplement 5.[3] The emission factors take account of vehicle mix, exhaust controls, percent hot/cold start, percent heavy duty vehicles and ambient temperature.

Air pollution emissions from the proposed garage was estimated at receptors directly downwind using procedures outlined in Appendix E of Volume 9. Appropriate emission factors for garage use incorporate a higher cold start percentage. The total CO impact at a receptor location is the sum of estimated background concentration, modeled concentrations caused by the local traffic and contributions resulting from the parking garage. Model calculations were performed for the one and eight hour peak traffic periods in the study area to evaluate compliance with state and federal standards.

Model Assumptions. Modeling of the CO impacts at selected receptor locations assumes that there will be normal growth in background traffic, induced growth in station related traffic, and proposed changes to the street system. Since the traffic flow in the area is predominantly that associated with city driving conditions, with traffic lights, acceleration/deceleration,

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[2]Zimmerman, J. R. and R. S. Thompson, "Users Guide for HIWAY: A Hiway Air Pollution Model", Environmental Monitoring Series EPA-650/4-008; U.S. Environmental Protection Agency, February 1975.

[3]Compilation of Air Pollutant Emission Factors, AP-42, U.S. Environmental Protection Agency, February 1976.

and idling, each lane of traffic was individually analyzed for its flow characteristics and the appropriate conditions were determined.

Since the U.S. EPA has mandated emission control limitations on future automobiles, future emissions are estimated assuming that these controls are implemented. Although it is likely that an Inspection/Maintenance Program will be implemented prior to 1982 or certainly by 1990, the benefit which would result from this program is presently not a requirement under either state or federal regulations. Emission factor calculations assume a minimum mean annual temperature of 48°F, 20 percent cold start operation on streets and 100 percent cold start operation in the garage. The light duty vehicle mix is assumed to be 88 percent automobiles and 12 percent gasoline trucks. In 1975 and 1982, the total vehicle mix is assumed to be 95 percent light duty and 5 percent heavy duty diesel since the low diesel percentage causes a worse case in 1982. In 1990, with lower automobile exhaust emissions, 10 percent heavy duty diesel trucks are assumed. Assumptions appropriate for each condition, during each analysis year are detailed in the Technical Supplement.

The background CO concentration was determined by reviewing late 1974 monitoring data collected for the South Station Urban Renewal Project[4] and at permanent monitoring sites in Kenmore Square and at the Callahan Tunnel (Figure 2). One of the South Station monitors, L Roselot, was located in a parking lot across Atlantic Avenue from the west entrance to the headhouse,

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[4]Air Quality Technical Support Document to the Environmental Impact Report - South Station Urban Renewal Project, P-1172-1, May 1975.

the other, M Tracks, was located near the tracks south of Kneeland Street. In addition, 1976 data from Kenmore Square and Callahan Tunnel was reviewed.

One and eight-hour CO concentrations were analyzed for all cases and cumulative frequency tables were generated. The data from L Roselot and M Tracks, located about 1/4 mile apart are in good agreement and should give a reasonably representative view of CO levels in the South Station area. In each case, the frequency distribution of one and eight-hour data is substantially the same.

The average hourly CO at the four sites in 1974 shows similar morning and afternoon peaking characteristics with levels at Kenmore Square and the Callahan Tunnel at least 2 ppm higher than those at South Station. The background concentration is the level resulting from sources other than the adjacent streets and as such is the concentration monitored when traffic is light rather than the peak levels directly related to heavy traffic.

Based on the South Station monitoring data, a background concentration of 2.0 ppm was assumed for both the peak one-hour and peak eight-hour periods. At least 60 percent of the readings from both monitors fall below this level. In 1976, at Kenmore Square and the Callahan Tunnel, the 2 ppm level is the lowest level recorded during the early morning hours, again with light traffic. This 2 ppm background concentration was added on to all model concentrations to obtain predicted levels at each receptor location.

CO emissions from the proposed garage project were modeled for worst case conditions. The emission factor for vehicles operating in the garage

assumes 100 percent cold start operation. All the emissions are considered to come from the ground level with emissions reflecting the total capacity of the garage. Only receptors potentially downwind of the garage are assumed to be impacted.

Traffic data used for the modeling assumed that the peak one-hour traffic occurs between 4:30 p.m. and 5:30 p.m. and that the peak eight-hour period is between 10 a.m. and 6 p.m. The eight-hour traffic data was broken down into a peak two-hour period between 4 p.m. and 6 p.m., and an off-peak six-hour period between 10 a.m. and 4 p.m. Since the streets around South Station are adjacent to the Central Artery, Massachusetts Turnpike and a major route to South Boston, the average eight-hour volumes are very similar to the peak-hour volumes.

Receptor Locations. The improvements to South Station, construction of a parking facility will cause some increased vehicle activity and therefore some increase in local air pollution emissions in the vicinity of the site. To assess the air pollutant impact, changes in traffic flow and volume were analyzed, and the network where a ten percent or greater increase in traffic will occur was established. This area was visited and potential receptor locations were identified (Figure 3). They are:

1. The area directly in front of the headhouse on the corner of Atlantic Avenue and Summer Street (Receptors A_A/A_S).
2. The area in front of the Atlantic Avenue entrance to the headhouse (Receptor B).
3. The area in front of the Essex Hotel on Atlantic Avenue (Receptor C).
4. The area in front of the proposed parking garage entrance on Atlantic Avenue (Receptor D).

5. The area in front of the "Blue Diner" on the corner of Kneeland and South Streets (Receptor E).

6. The area along Purchase Street where pedestrians pass between South Station and the business district (Receptor F).

7. A concrete bench in front of the Federal Reserve Bank building along Atlantic Avenue (Receptor G).

Under the proposed action high vehicle use and volume changes are anticipated on the streets adjacent to these areas. Of these seven locations, six were chosen for further analysis. Receptor D was omitted since it is subject to conditions virtually identical to those at Receptor C. Receptor A functions as two receptors, one sensitive to Atlantic Avenue (A_A) and one sensitive to Summer Street (A_S). Receptors A_S, A_A, F and G are located so that the closest traffic lane is 10 meters away. Receptors B, C, and E are located in the middle of the sidewalk and are less than 5 meters from the closest traffic lane.

OPERATIONAL IMPACTS

The CO at each of the six selected receptors was modeled for 1975, the existing conditions; 1982, one year after the NECIP is completed; and 1990, the design year for the NECIP. Projected ambient CO levels were modeled for:

> One level parking deck (500 spaces) and one level Bus Station in 1982; three additional parking levels (1,500 additional spaces).

CO Modeling Results. Predicted ambient CO concentrations at each receptor location are the sum of the assumed background level and the concentration resulting from traffic on the adjacent street. Receptor C concentrations include the downwin impact of the emissions from the parking garage. The resulting concentrations for all years, are shown in Figures 4 and 5.

In modeling many developments of this type, the vehicle exhaust emission controls mandated by the Clean Air Act are a powerful tool which reduce predicted ambient CO levels to well below standards by 1990. In the vicinity of South Station, this beneficial control does not provide enough improvement to off-set the effects of the project and traffic network redesign by the city. Although the concentrations predicted at Receptors A_A, E and F exhibit the typical reduction in ambient concentrations expected when comparing 1982 and 1990, Receptors A, B, C, and G show either minor reductions or, in some cases, higher levels in 1990 than in 1982. Since the predicted worse case concentrations for the "do-nothing" alternative are above the 9 ppm standard at four receptors, the increased traffic under the project development for 2,000 spaces, only exacerbates an existing violation.

The traffic volume increases along Atlantic Avenue at a faster rate than the Clean Air Act mandates reduce automobile exhaust emission. The additional pollution is largely the result of increased traffic on a one-way northbound Atlantic Avenue. Traffic is diverted to Atlantic Avenue by the realignment of the Massachusetts Turnpike exit to the foot of Atlantic Avenue and the closing of the Surface Artery through Dewey Square. Traffic intersections along Atlantic Avenue and Summer Street have volume to capacity ratios ranging from 0.8 to 1.0 as a result of the street changes alone.

The predicted CO impact suggests that the major impact on Atlantic Avenue and Summer Streets will be caused by the increased traffic generated by the street circulation plan, rather than the increased traffic from the proposed 2,000 car garage. An analysis was therefore completed which compared the proposed CO from the realigned 1990 traffic with what would be predicted in 1990 with the 1982 traffic circulation plan, assuming normal growth. The model predictions

(Figure 6) clearly illustrates the magnitude of the impact of the street changes. At Receptors A_A, B, C, and E, the 1982 street network results in significant decreases in CO concentration compared to the proposed 1990 network. At Receptors A_A, C and E, violations of the standard are no longer predicted, while at Receptor B, concentrations are brought within 0.9 to 1.4 ppm of the standard. Receptor F shows a small (less than 1 ppm) benefit from the proposed street changes while Receptor A_S shows essentially no change. Thus, while the impacts of the project relative to the "do-nothing" alternative is less than 11 percent at six of seven receptors, predicted eight-hour standard violations resulting primarily from the proposed street changes make compliance with the standard virtually unattainable.

In summary, the existing CO levels predicted through modeling indicate that the 1977 eight-hour levels are above the 9 ppm eight-hour standard at six of the seven sites selected for analysis. By 1982, whether or not there are any changes at South Station, worst case modeling predicts violations of the eight-hour standard at four sites, while additional violations are predicted for the full development. In 1990, with a redesigned traffic network, exceedance of the 9 ppm standard is predicted at 3 sites. Two additional sites show marginal exceedance. The largest impact is at Receptor C where the CO levels predicted for 1990 are actually higher than in 1977 or 1982. Finally, an analysis of this small section of the Boston Street network indicates that the ambient CO levels would be lower if the proposed street improvements were

not realized. However, although these improvements are predicted to cause local hot spots in the South Station area, it may be providing relief in another area outside the scope of this analysis.

AIR RIGHTS IMPACTS

The improvements to South Station include the construction of an air rights parking garage over the platform area with one of five levels to be used as a bus terminal. This air rights will limit the natural dispersion of locomotive diesel exhaust, and bus diesel exhaust. A detailed air quality impact analysis has not yet been completed for these sources of pollution. Presently, the air rights is at preliminary design and details on the size, shape, and capacity of the bus depot and venting system are not well enough established to define potential impacts.

Construction Impacts

Construction phasing for this project has not yet been determined. The major activities associated with the improvements to South Station include:

- Renovation of the existing headhouse area
- Realignment of tracks in station area and construction of high level platforms
- Construction of a parking garage above the platform level
- Construction of a bus terminal on the second level at air rights
- Construction of three additional levels of parking

The emissions from the equipment is minimal, will be of short duration, and will not adversely impact local air quality. Nevertheless, the equipment should be placed as far as possible away from the station and the adjacent building air intakes.

The particulate or fugitive dust emissions from the site may have substantial short-term impacts. Particulate emissions will occur during minor demolition activity, ground excavation, stockpiling of material, sandblasting, movement of equipment on the site and transport of materials to and from the site. The fugitive dust is generally a problem during periods of intense activity and is accentuated by windy and/or dry conditions. Compliance with Massachusetts' fugitive dust regulations, 310 CMR 7.09 requires written notification to the Department of Environmental Quality Engineering 20 days prior to initiating demolition or construction activities.

The quantity of dust emissions from construction activities has been estimated at a monthly rate of 1.2 tons per acre of construction activity.[1] Although this factor is more appropriate for a drier climate (precipitation - evaporation index of 50 vs. 132 for the Boston area), it gives an upper estimate of 345 tons of emissions per year on the 24 acre site. The annual emissions, however, are not

as major a concern as the peaked short-term emissions, which can be experienced when proper controls are not followed.

Sandblasting requires a temporary permit from the Boston Air Pollution Control Commission pursuant to Regulation 5. Sandblasting activities must be enclosed or curtained-off such that no visible emissions result. Demolition of any structures containing asbestos insulation or fireproofing will require estimation of the amount of asbestos and written notification to DEQE and EPA, to comply with the National Emissions Standards for Hazardous Air Pollutants.

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[1]Compilation of Air Pollutant Emission Factors, AP-42, U.S. Environmental Protection Agency, February, 1976.

VII NOISE IMPACTS

No long-term railroad noise impacts on noise sensitive land uses are expected for Boston South Station as a result of the NECIP. Noise from rail activity is on the order of 10 dB below the baseline ambient condition. Changes in motor vehicle traffic induced by the project are not expected to cause any long-term impact owing to the already high existing traffic volumes. However, a potential vibrating problem exists in terms of vibration transmission from rail, bus, and garage traffic to the proposed complex. This potential problem will be addressed when the project is further in the design phase.

Existing Noise Conditions

Boston South Station is located in an urban area of downtown Boston, Massachusetts, with predominantly commercial and industrial land uses. The only noise sensitive location in the vicinity of the station is the Hotel Essex, located on Atlantic Avenue between Essex Street and East Street.

Motor vehicle traffic is the major source of existing noise in the area surrounding the station. In order to compare the contributions of traffic and rail noise to the total noise environment in the vicinity of the station, estimates of current noise exposures from these sources were made using road traffic data and current rail operational data.

Table 7 lists the estimated day-night sound levels (L_{dn}) for current traffic at representative locations in the vicinity of the station. As Table 7 indicates, the estimated L_{dn} levels resulting from motor vehicle traffic are quite high, varying between 77 and 80 dB for the streets bordering the station, with lower levels on side streets. Current rail operations are estimated to result in an L_{dn} of 70 dB at 100 ft. from the tracks. This level indicates that rail noise exposure is lower than traffic noise exposure in the station vicinity.

Table 7. Estimated Current Traffic Noise Levels

Location	L_{dn}(dB)
1. Atlantic Avenue, Essex to Beach	78
2. Atlantic Avenue, Beach to Kneeland	77
3. Essex Street, South to Atlantic	66
4. Summer Street, west of Atlantic	77
5. Summer Street, east of Atlantic	80

Brief noise measurements were conducted near the Atlantic Avenue station perimeter to document the noise emission from idling diesel locomotives. A measurement at 100 ft. from a single diesel locomotive indicated a noise level of 70 dBA. A measurement at the station perimeter, at an average distance of 200 ft. from 4 to 5 idling locomotives, indicated an overall level of 68 dBA. These measurements, along with the diurnal noise, suggest that noise caused by idling locomotives in the station vicinity are below the ambient noise levels.

Future Noise Conditions

Traffic volumes in the vicinity of the station are expected to change in the future as a result of normal growth and project implementation. Traffic noise exposure estimates were based on expected 1982 and 1990 traffic flows. These results indicate no significant differences in traffic noise levels between the baseline (no-build) condition and the total project.

Rail operations and corresponding noise exposures are expected to change only slightly in the future as a result of the NECIP. The expected total 1990 L_{dn} noise exposure for rail operations, with improved intercity rail is 69 dB at 100 ft., or 1 dB below current conditions. The rail noise exposure (L_{dn}) for the 1990 baseline condition is estimated to be 70 dB at 100 ft., or 1 dB higher than the estimated exposure for 1990 operations with improved intercity rail.

Long-Term Impact

Existing noise levels are already high in the vicinity of the station, primarily as a result of local street traffic. Noise predictions for the future indicate that traffic will continue to be the dominant noise source in the vicinity of South Station. By comparing the contribution of total railroad noise in 1990 with the 1990 baseline condition, noise from rail activity is on the order of 10 dB below the baseline condition in the station vicinity. Therefore, the potential for long-term noise impact from the project will lie in changes in traffic.

In conclusion, the noise impact in the vicinity of Boston South Station owing to the NECIP will be insignificant for both traffic and rail activities.

Short-Term Impact

Too early in the design to make specific remarks.

VIII NATURAL ENVIRONMENTAL IMPACTS

The Boston South Station Project area is an environment intentionally altered by human activity. It has been used throughout the 20th century as an urban/industrial/transportation center. The proposed project can contribute to improved water quality in the Fort Point Channel through modernized storm drainage on the site. No significant effects to the regional sewerage system flows or pollutant loadings are anticipated, and project design and construction will be coordinated with existing sewer improvement plans for the area. Disposal of construction spoil and solid waste will be coordinated with the appropriate local and regional agencies to avoid any serious adverse impacts. Finally, the project poses no significant adverse effects to local soils, vegetation and wildlife because the project area is totally developed.

Water and Soil

South Station is located in an area of extremely poor subsurface conditions, which must be considered in the design of any new improvements. Elevations at the project site range from about 12.5 feet above mean sea level (msl) at Summer Street and Atlantic Avenue to about 18.5 feet msl in the track area and along Dorchester Avenue. Man-made soils and fill consisting of sand, gravel, ashes, brick and wood predominate throughout the site. A typical soil profile consists of a twenty-foot layer of fill over a sandy organic silt layer about fifteen feet thick, followed by sixty feet of marine clay and twenty feet of glacial till over bedrock. Historically, flood elevations since 1723 have ranged between nine and eleven feet msl. The 100-year storm flood level has been estimated at 10.8 feet msl, below the project site elevation.

Water quality in the Fort Point Channel is very poor. Anaerobic conditions existing there have been brought about by numerous stormwater overflow pipes and possible oil dumping into the channel. Groundwater occurs at a mean depth of 3.4 feet and msl, and ranges from 0.4 to 5.4 feet msl.

Nearly 80,000 cubic yards of earth, concrete and masonry waste will be generated by the proposed action. Of this total, 25,000 cubic yards of excavated earth will be reused on site. The remaining 55,000 cubic yards would be subject to erosion if left on site.

Due to subsurface conditions, extensive site preparation for track and station work will be required, and additional analysis of the requirements for parking structure supports must be made. These analyses must be coordinated with the interceptor sewer relocation program, as well. Potential impacts to guard against include settling of surrounding structures and lowering of area groundwater.

IX CULTURAL RESOURCES

Historical

The headhouse portion of the South Station Terminal Structure, which is the symmetrical curved corner building, is listed on the National Register. The east wing extension of the headhouse which presently houses the Amtrak and MBTA ticket offices is not listed on the Register. This proposed action intends to treat both the headhouse and the east wing with the same respect for historic significance. The east wing and headhouse are all that now remain of the former monumental structure, which originally extended from Summer Street along Atlantic Avenue and along Summer Street to Dorchester Avenue and down that street.

Preservation of South Station as a passenger railroad terminal is the use most respectful of the building's historic significance. Project architects will actively strive to preserve and enhance the historic qualities of the headhouse and east wing, and will actively consult, as appropriate with the Massachusetts Historical Commission and the Advisory Council on Historic Preservation. Particular attention will be paid to:

1) Preserving all architectural detail on both the exterior and interior;
2) Repairing and renovating where necessary to maintain the structural integrity of the building, with materials that do not detract from its historic qualities;
3) Making changes on the interior that are necessary for the building's commercial and public service viability without destroying architectural details or altering historically significant aspects.

Thus, all current plans for the NECIP South Station project are designed to insure that there will be no negative effect on the historic significance of the headhouse site.

While there are other areas of historic interest in the vicinity of South Station, such as Fort Point Channel, Church Green, and the leather district, these areas will not be directly impacted by the proposed action. Secondary

land use impacts resulting from new development at South Station may occur as areas such as the leather district become more attractive for development. Such secondary effects on land use accompany any major development project in an urban area. The particular sections of Boston which will be affected by these secondary impacts, although of some interest historically, do not contain any unique architectural or cultural resources. Any spin-off development produced would be privately funded and only tangentially related to the proposed action.

Archaeology

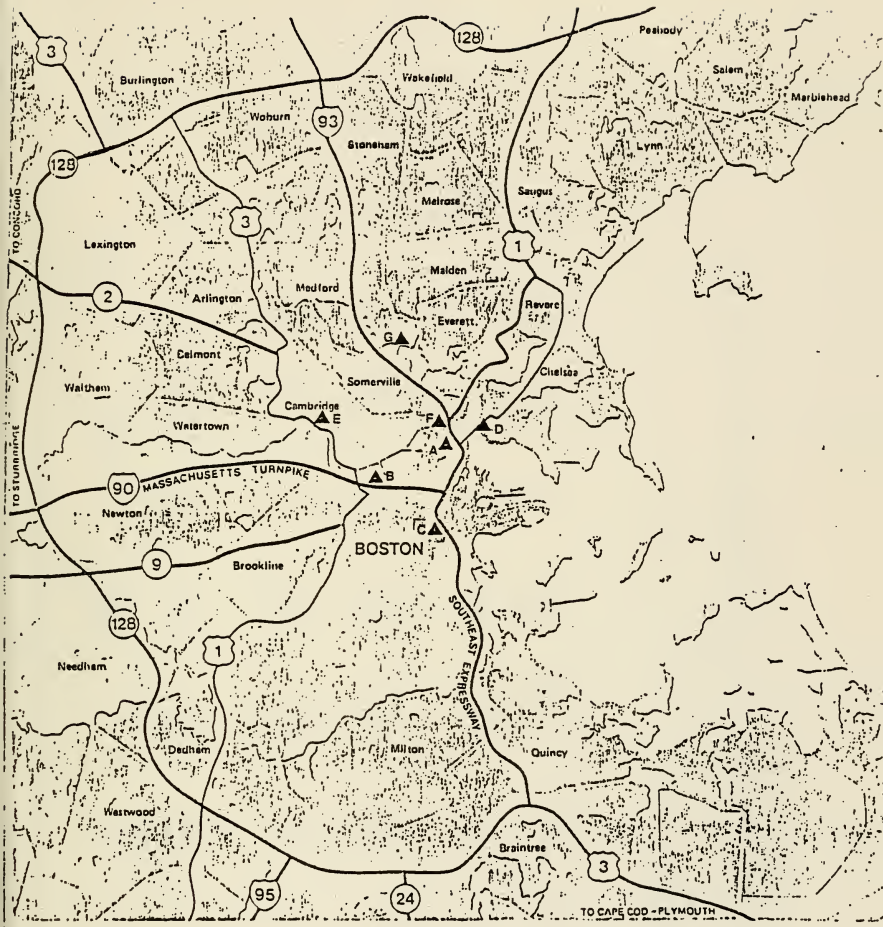
The proposed South Station program has been reviewed for its effect on archaeological resources. The nature of the proposed construction has been considered, pertinent documents have been researched, and a field reconnaissance survey has been conducted.

Most of the site was covered with water until the mid-1800's when it was filled and became a mixed use area and commercial waterfront. Evidence of this early period was virtually eliminated when the site was leveled in the late 1800's.

Significant archaeological remains, therefore, are confined to the period of 1890 on and represent railroad related structures.

Because of the site's limited history and the fact that it is fill, the proposed action will not affect any subsurface cultural resources and no intensive field archaeological investigation is necessary.

APPENDIX A



A. Boston, JFK
B. Boston, Kenmore Square
C. Boston, Southampton
D. East Boston, Callahan Tunnel
E. Cambridge, Harvard Arboretum
F. Cambridge, Science Park
G. Medford, Wellington Circle

FIGURE 1

AIR QUALITY
MONITORING STATIONS

Table 1

1976 AND 1977 AIR QUALITY DATA SUMMARY

	NO (ppm)		SO_2 (ppm)	TSP (ug/m3)		CO (ppm)		OZONE (ppm)
SITE LOCATION	Average Arithmetic Mean	Annual Arithmetic Mean	Maximum 24 hr	Annual Geometric Mean	Maximum 24 hr	Maximum 1 hr	Maximum 8 hr	Maximum 1 hr
PRIMARY STANDARDS	0.05	0.03	0.14	75	260	35	9	0.08
1976								
Boston, J.F.K.	0.030	0.008	0.029	57	149	ND	ND	ND
Boston, Kenmore Square	0.043	0.010	0.031	98[a]	264[a]	23	16.6[a]	ND
Boston, Southampton	I.D.	I.D.	0.025	I.D.	112	ND	ND	ND
East Boston, Callahan Tunnel	ND	ND	ND	ND	ND	25	15.3[a]	ND
Cambridge, Harvard	0.026	0.004	0.025	45	146	ND	ND	ND
Cambridge Science Park	I.D.	I.D.	0.050	I.D.	101	17	11.4[a]	ND
Medford, Wellington Circle	0.037	0.010	0.058	76[a]	283[a]	24	16.0[a]	0.164[a]
1977								
Boston, Kenmore Square	0.042	0.014*	0.045	79[a]	305[a]	25	14.4[a]	ND
East Boston, Callahan Tunnel	I.D.	I.D.	0.031	ND	ND	26	11.4[a]	ND
Cambridge, Harvard	ND	0.006*	0.023	I.D.	145	ND	ND	ND
Cambridge Science Park	0.033	0.012*	0.045	66	116	18	11.1[a]	ND
Medford, Wellington Circle	0.033	0.008*	0.025	I.D.	161	22	13.5[a]	0.170[a]

Notes:

ND - No Data
ID - Insufficient Data
* - Summer Quarter not included
a - Exceeds State and National Primary Standard

Source:

State of Massachusetts, Department of Environmental Quality Engineering, Division of Air and Hazardous Materials, Air Quality Summaries, 1976 and 1977.

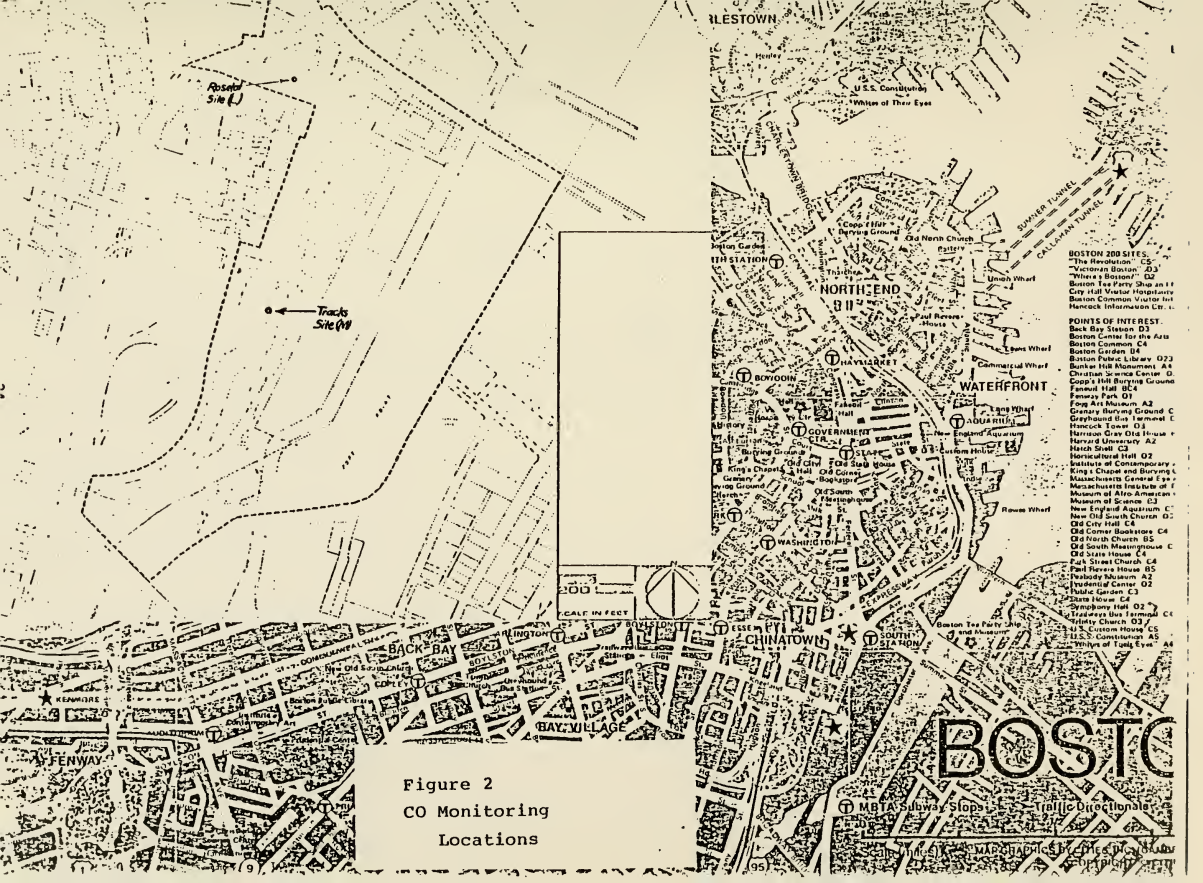


Figure 2
CO Monitoring
Locations

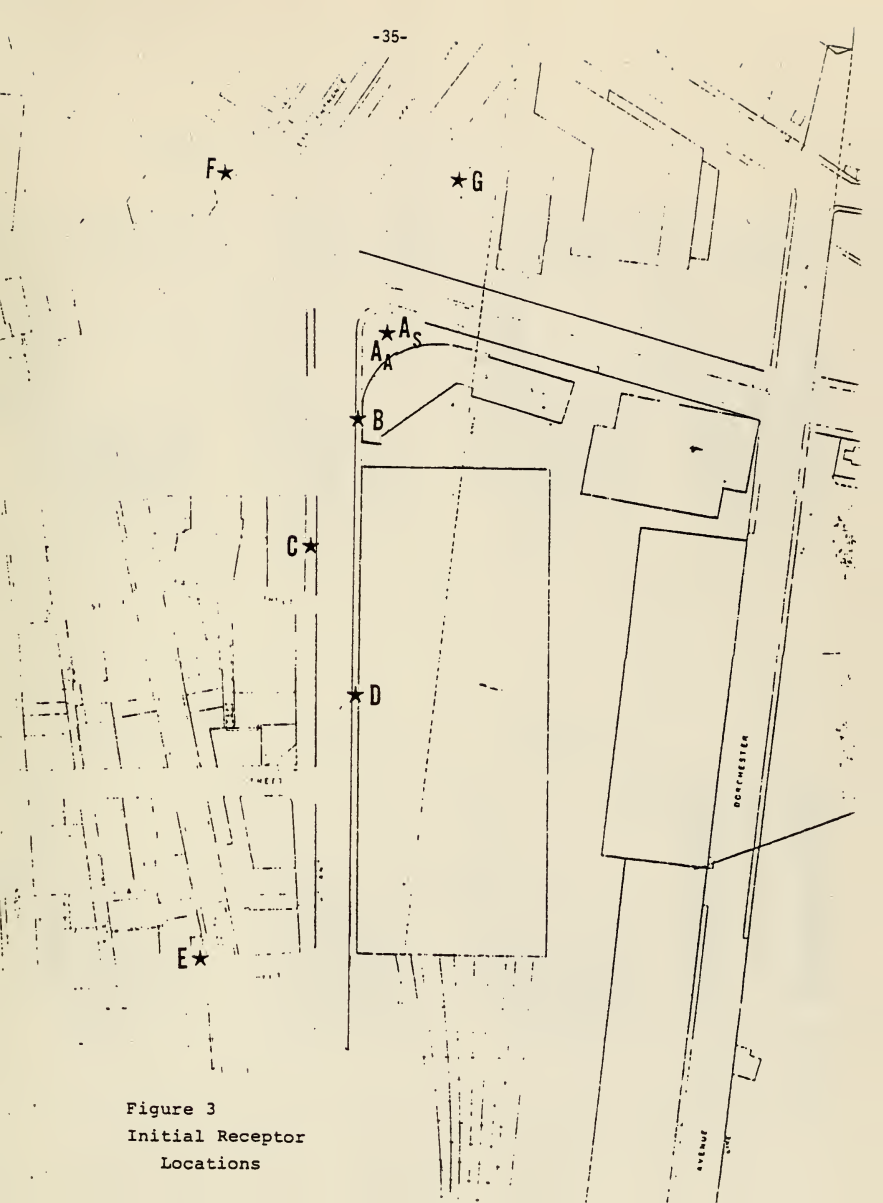
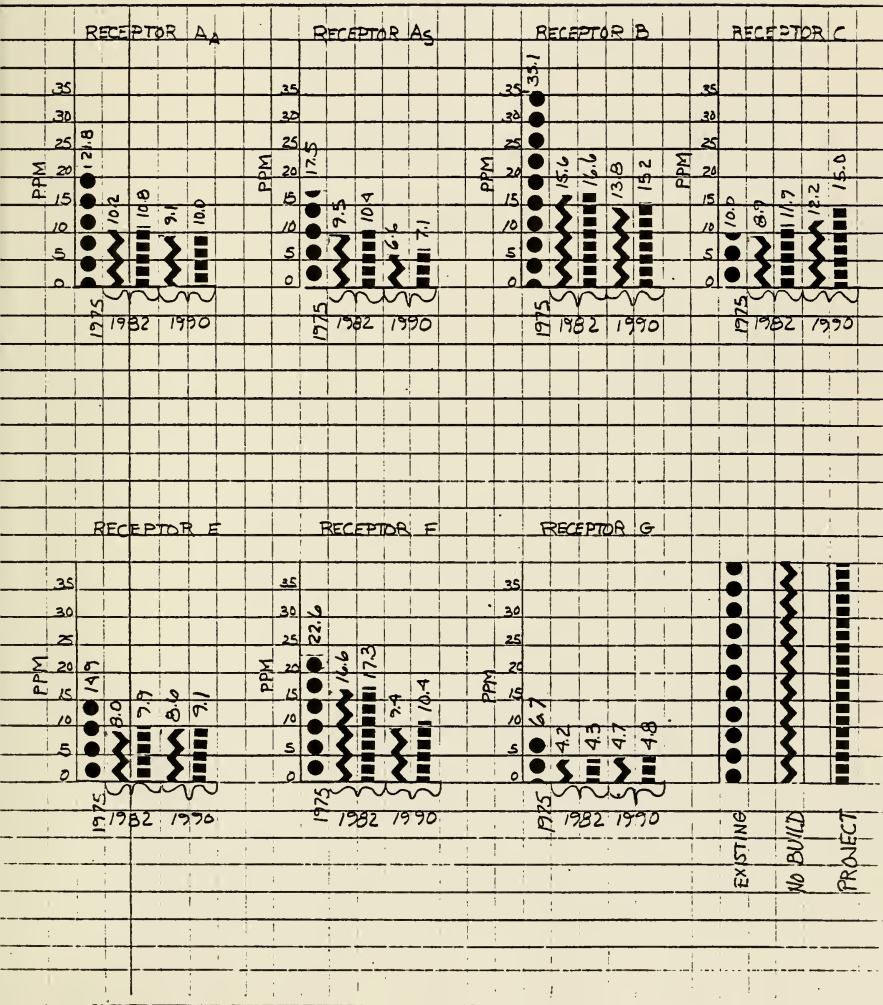


Figure 3
Initial Receptor
Locations

FIGURE 4

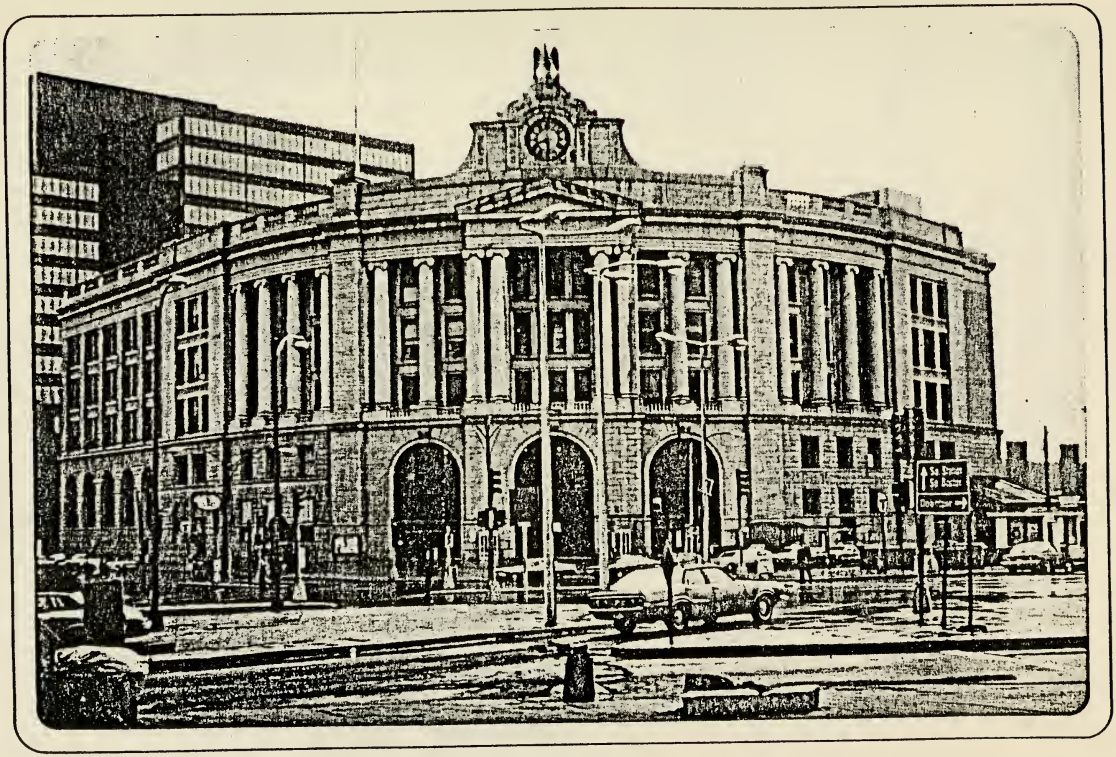
PREDICTED ONE HOUR CO

FIGURE 5
PREDICTED EIGHT HOUR CO



APPENDIX B

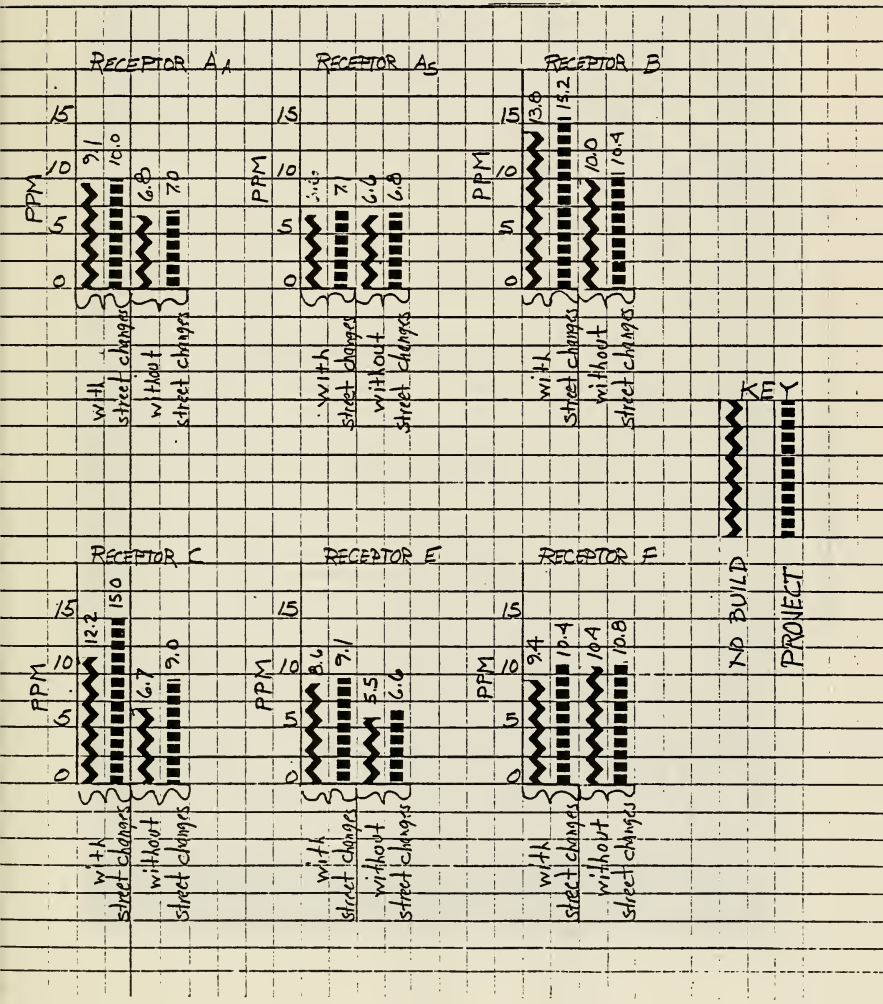
PICTURES AND PLANS

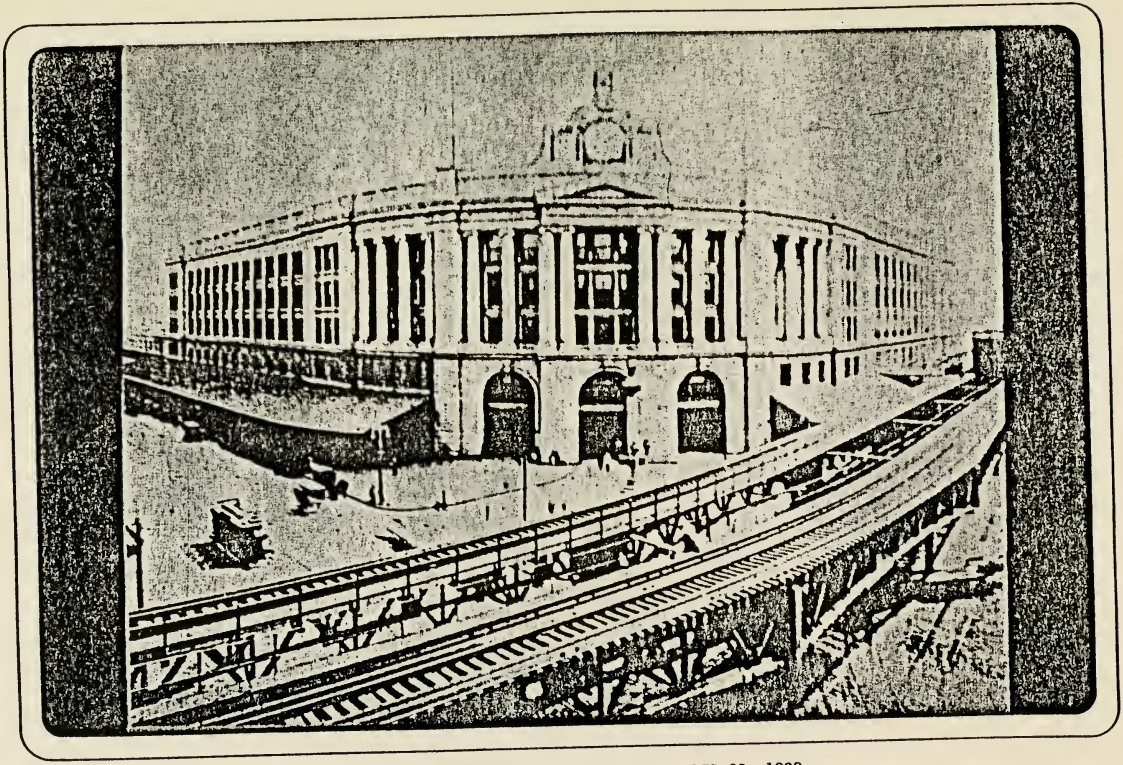


DEWEY SQUARE

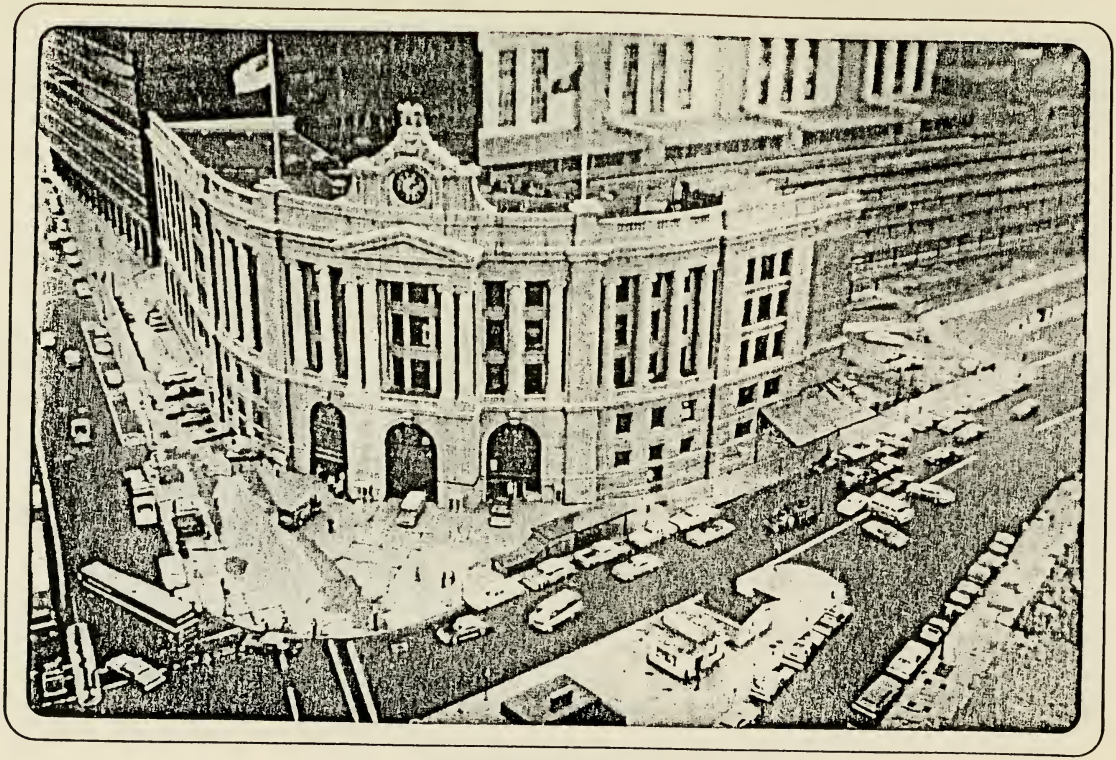
FIGURE 6

1990 CO CONCENTRATIONS WITH AND WITHOUT STREET CHANGES

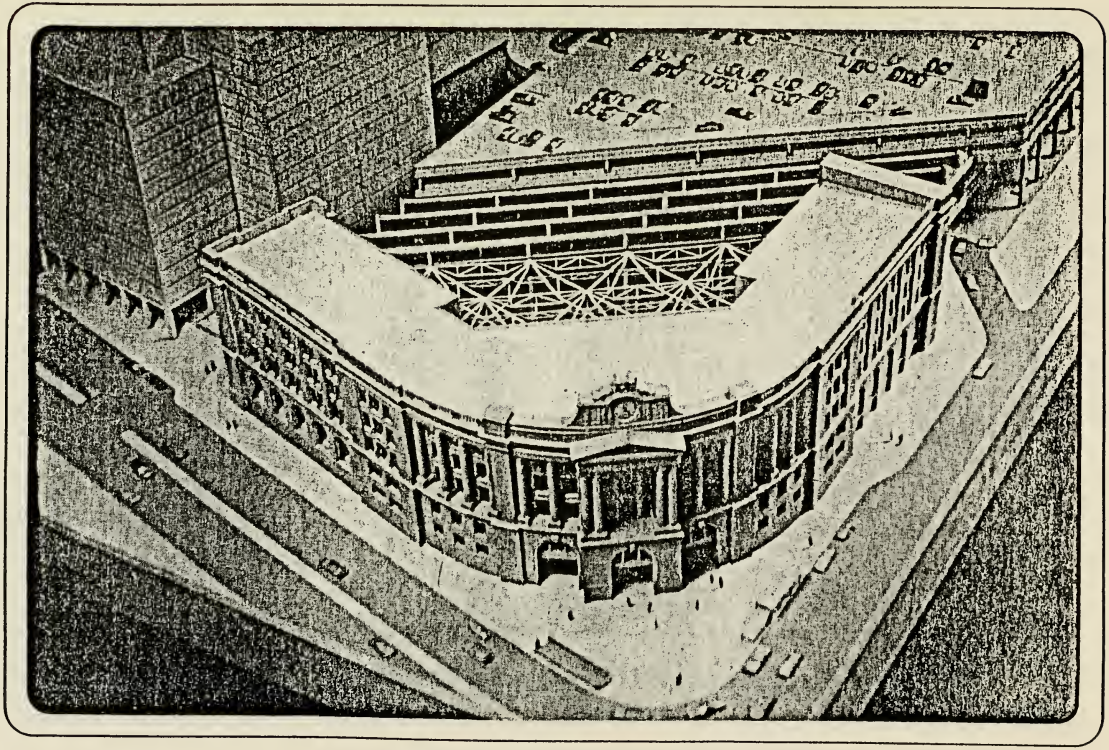




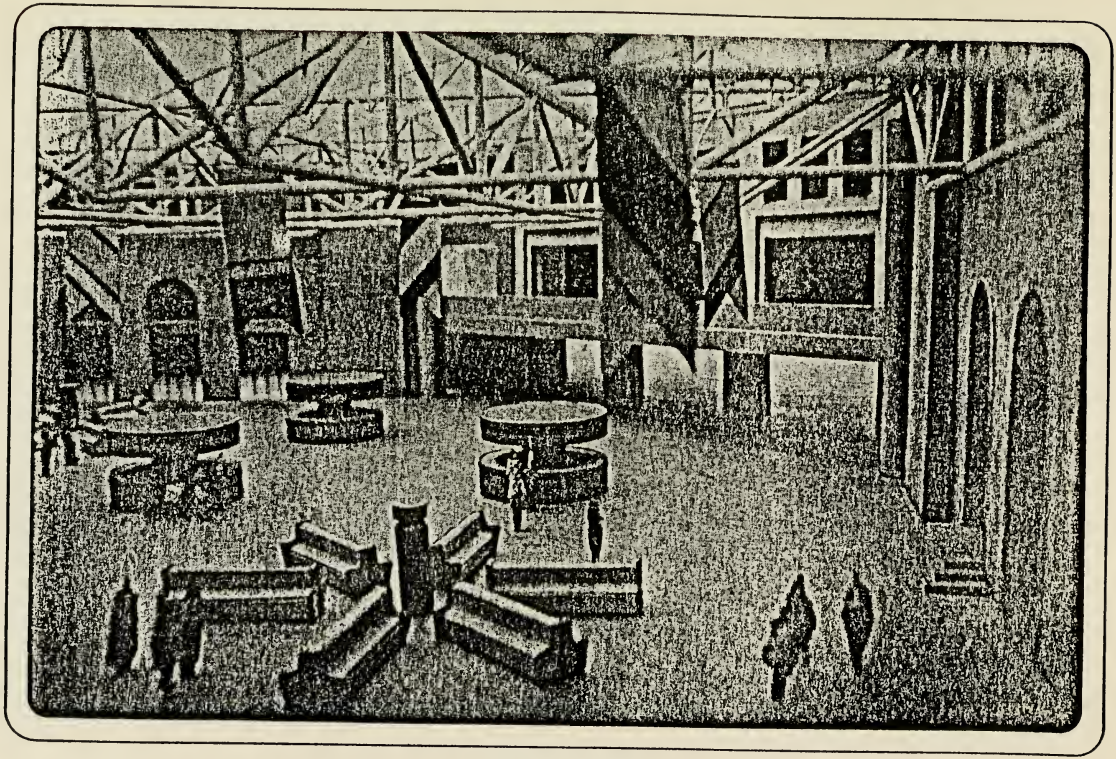
SOUTH STATION WAS DEDICATED ON DECEMBER 30, 1898



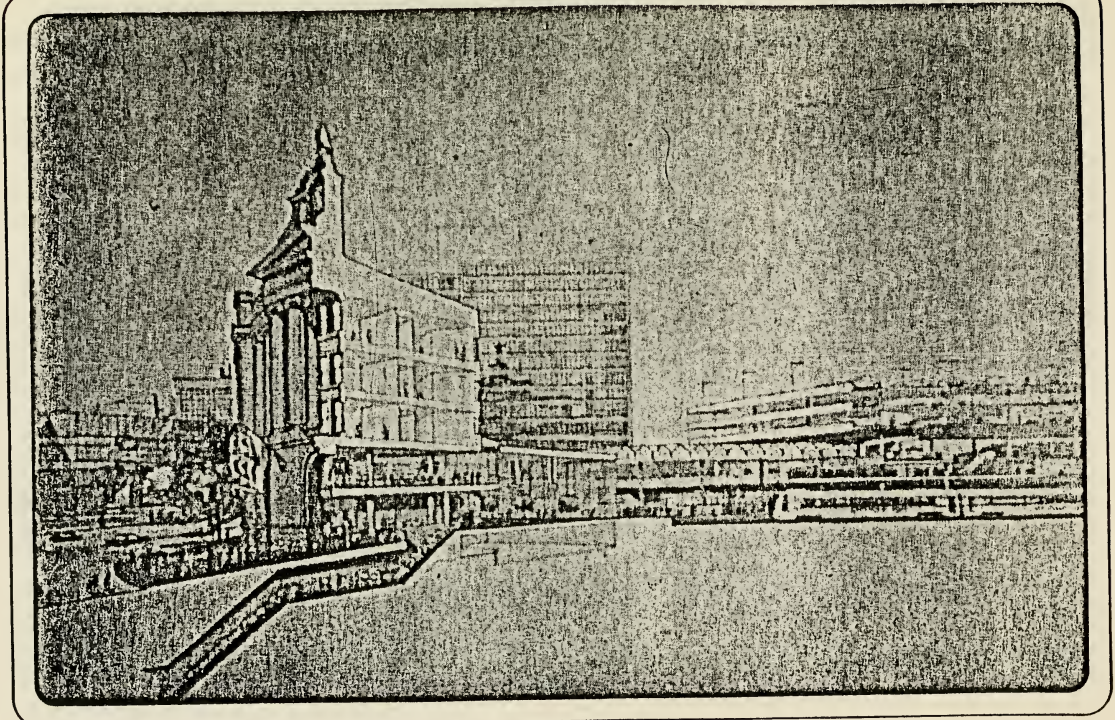
SOUTH STATION TODAY



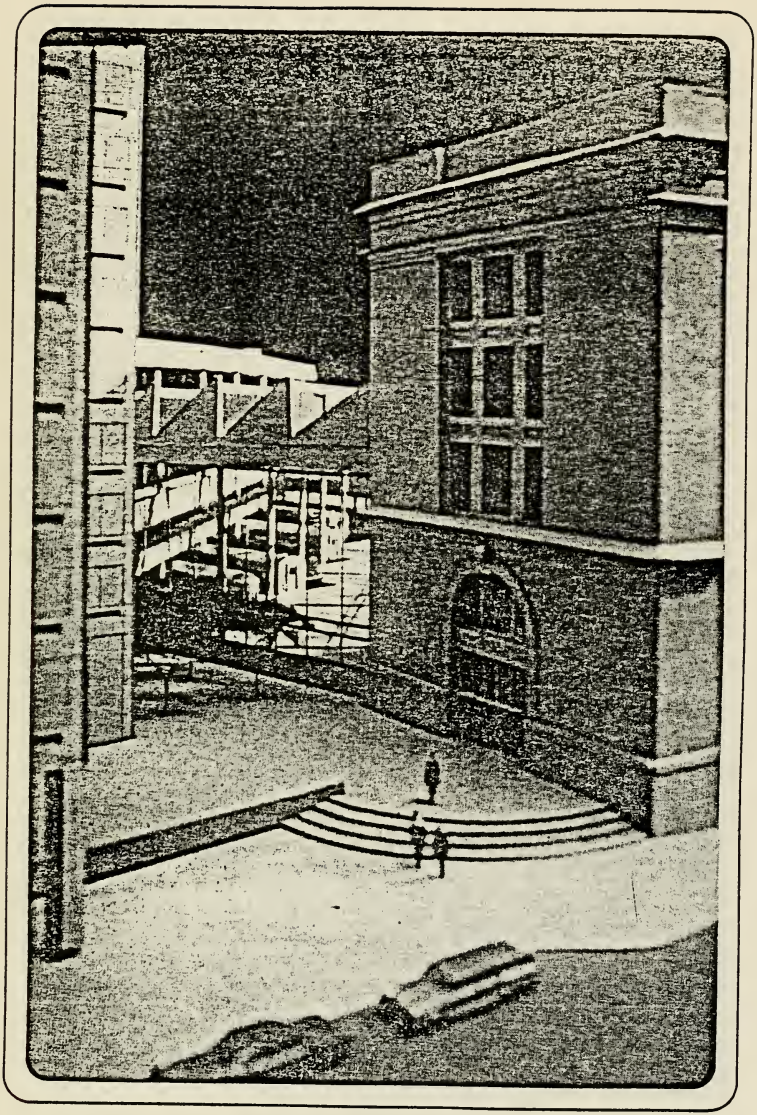
SOUTH STATION-PROPOSED DEVELOPMENT



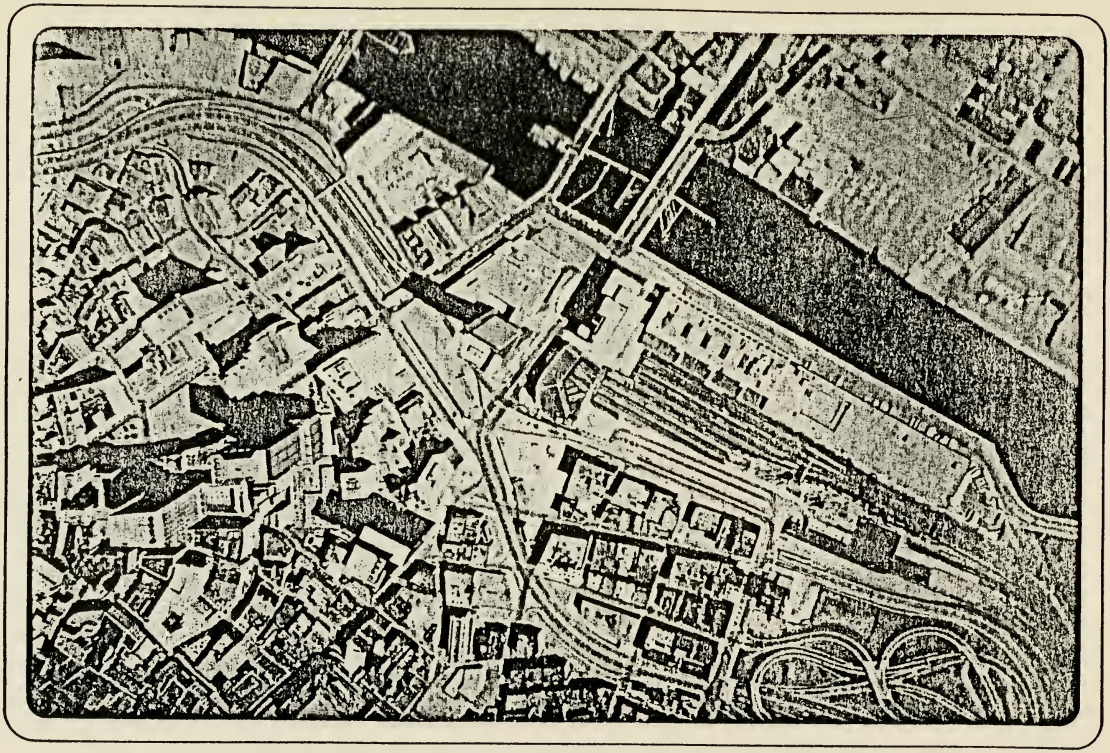
PROPOSED CONCOURSE



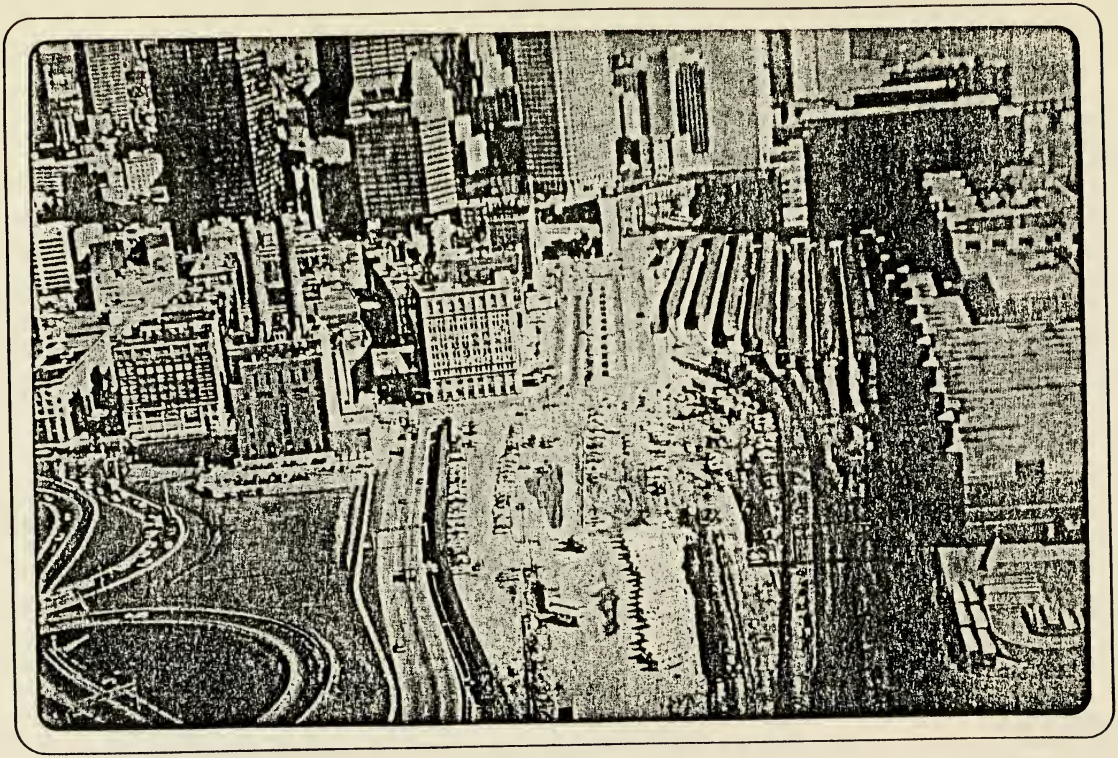
RED LINE ACCESS



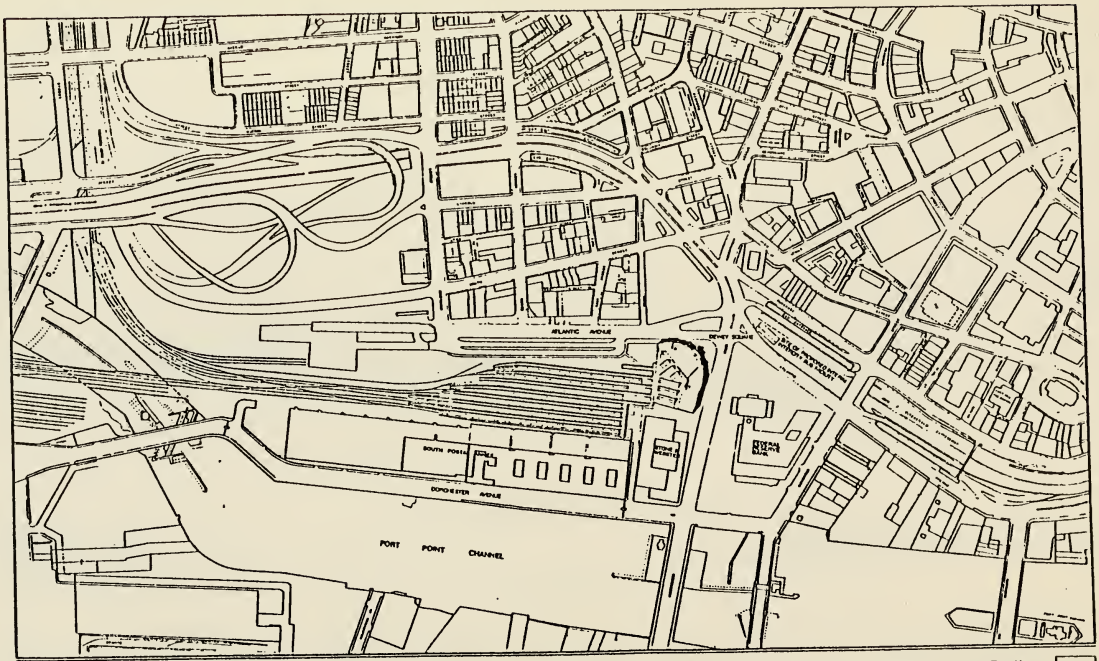
STONE & WEBSTER PLAZA



SOUTH STATION IS CENTERALLY LOCATED WITH EASY ACCESS TO MAJOR HIGHWAYS



MAINTENANCE FACILITY SITE

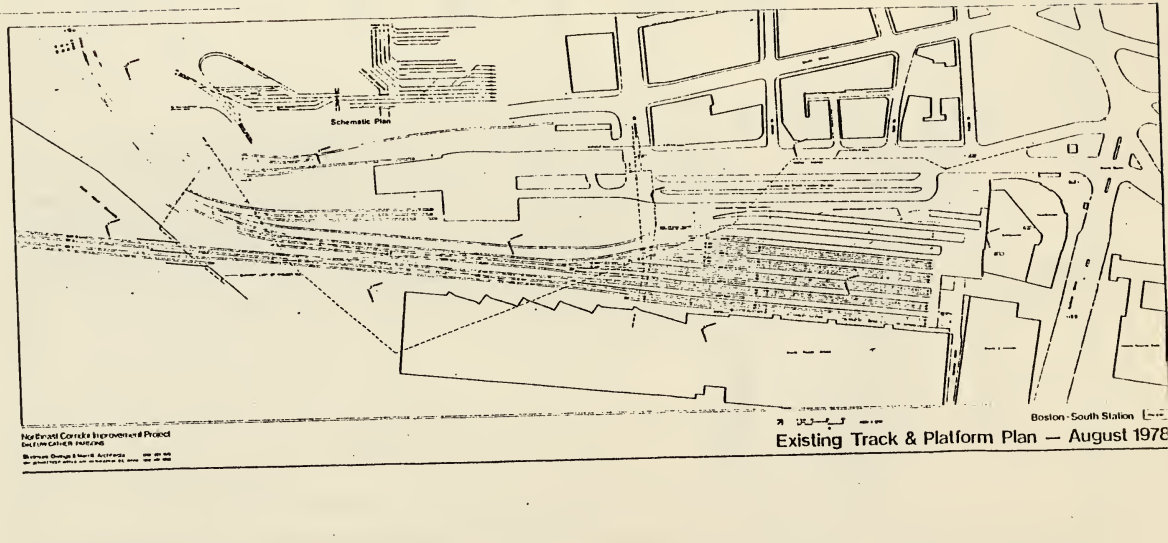


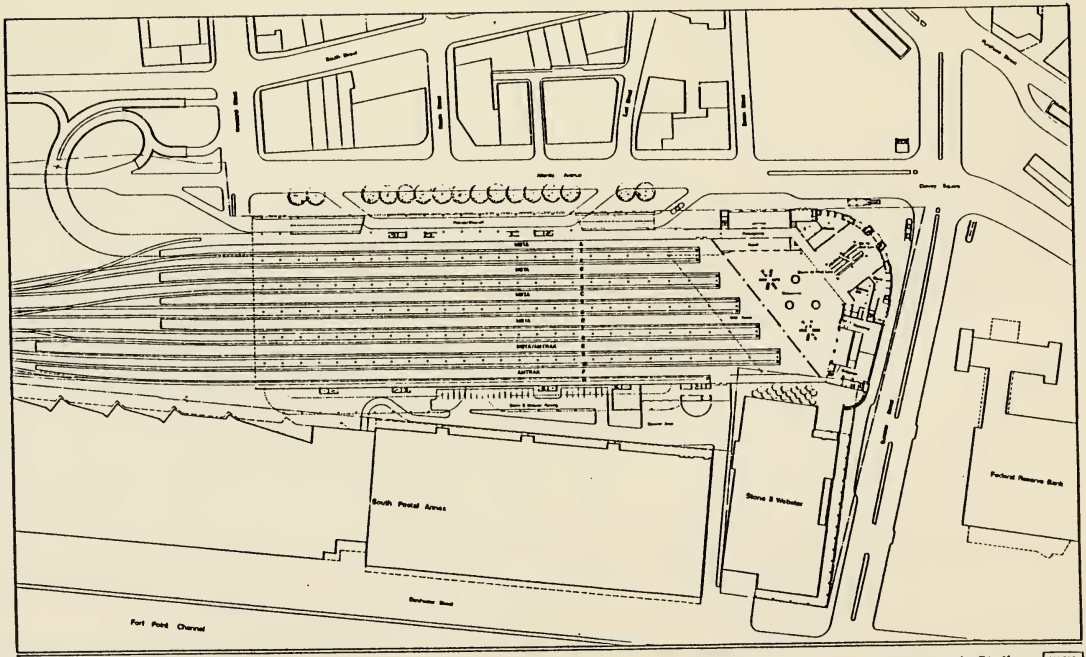
Northeast Corridor Improvement Project
DeLEUW, CATHER/PARSONS

Skidmore, Owings & Merrill /Architects

Boston South Station

Existing Vicinity Plan


Schematic Plan
Boston - South Station
Northeast Corridor Improvement Project
Existing Track & Platform Plan — August 1978



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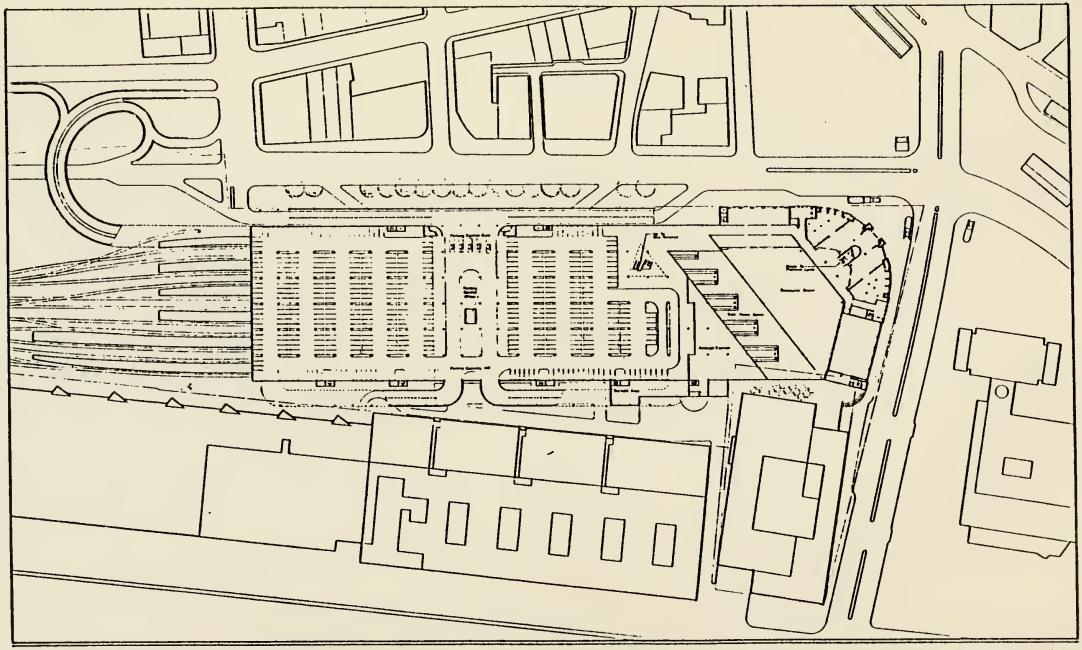
Skidmore, Owings & Merrill/Architects

Phase I
Future Development

Boston South Station

Platform & Concourse Level Plan



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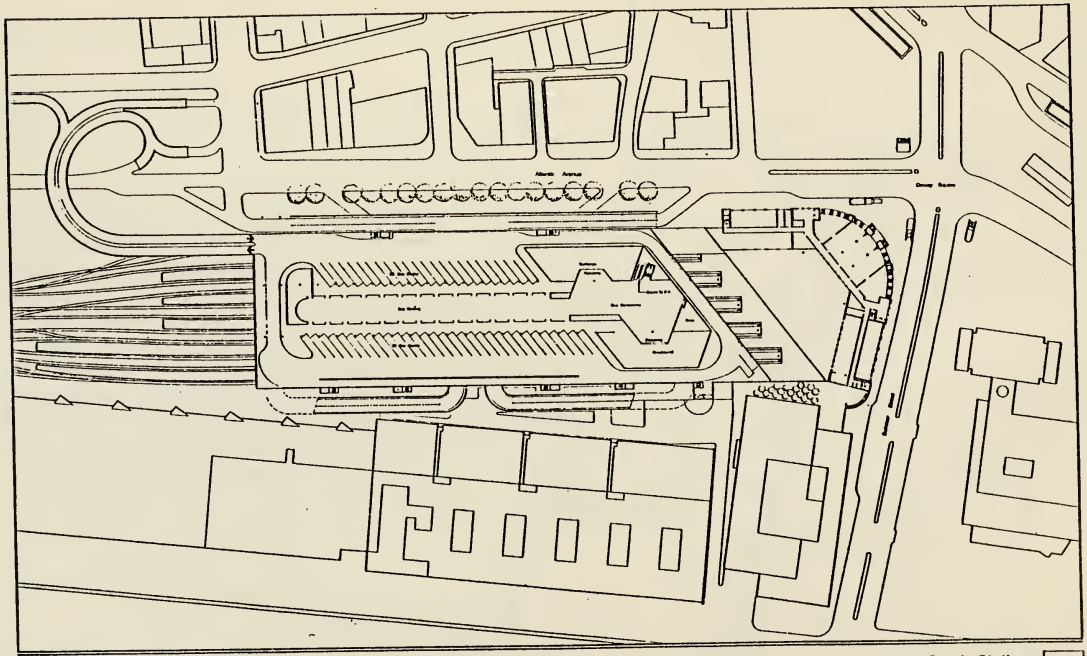
Phase I
Future Development

Boston South Station

1st Parking Level Plan



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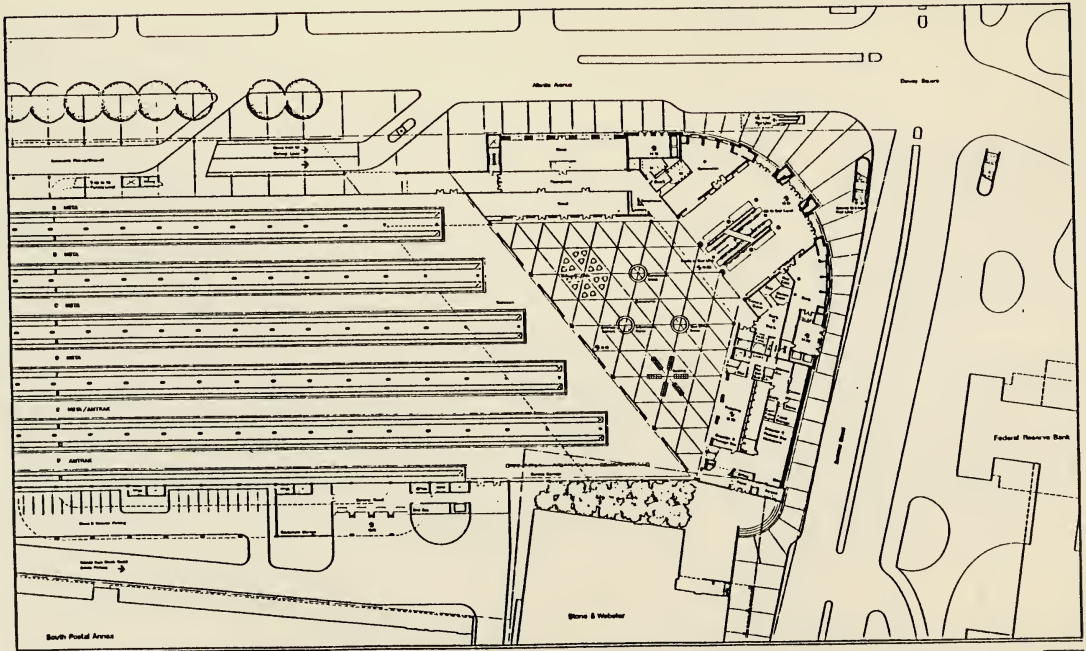
1301 CONNECTICUT AVENUE N.W. WASHINGTON D.C. 20036
(202) 462-1000

Phase 1
Future Development

NOV 1 1978

Boston South Station

Bus Terminal Level Plan



Northeast Corridor Improvement Project
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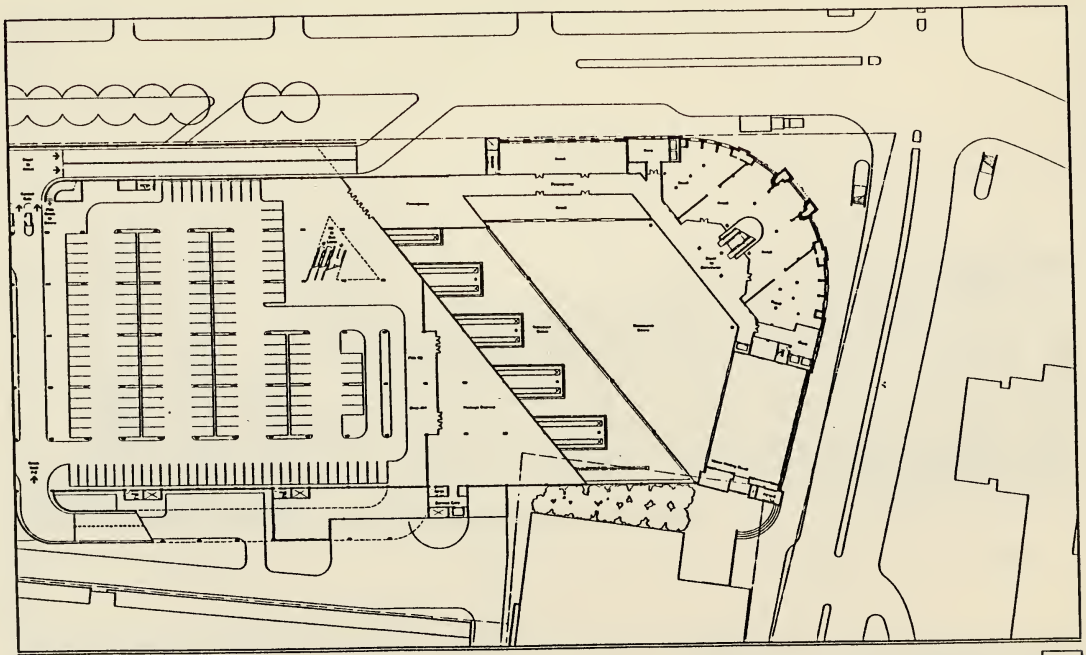
Skidmore, Owings & Merrill / Architects
[illegible] CONNECTICUT AVENUE, N.W. WASHINGTON, D.C. 20036
[illegible] 223 4676
(202) 452 1600

Future Development

NOV 1979

Boston South Station

Platform and Concourse Level Plan



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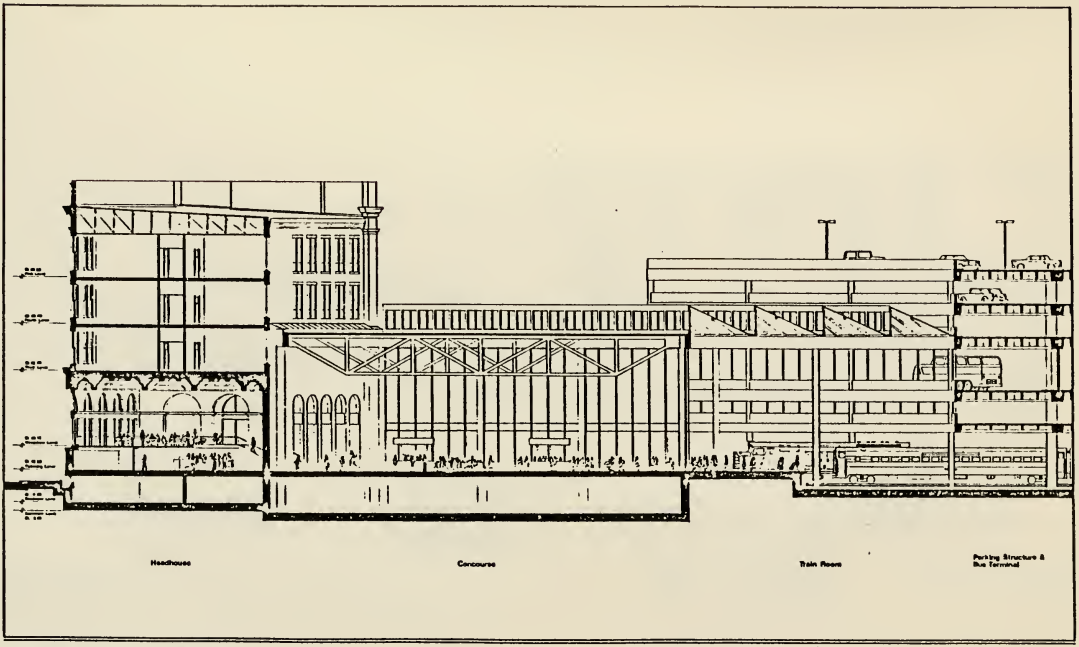
1211 CONNECTICUT AVENUE, N.W. WASHINGTON, D.C. 20036
(202) 466 1606

Future Development

NOV 1 1979

Boston South Station

1st Parking Level Plan



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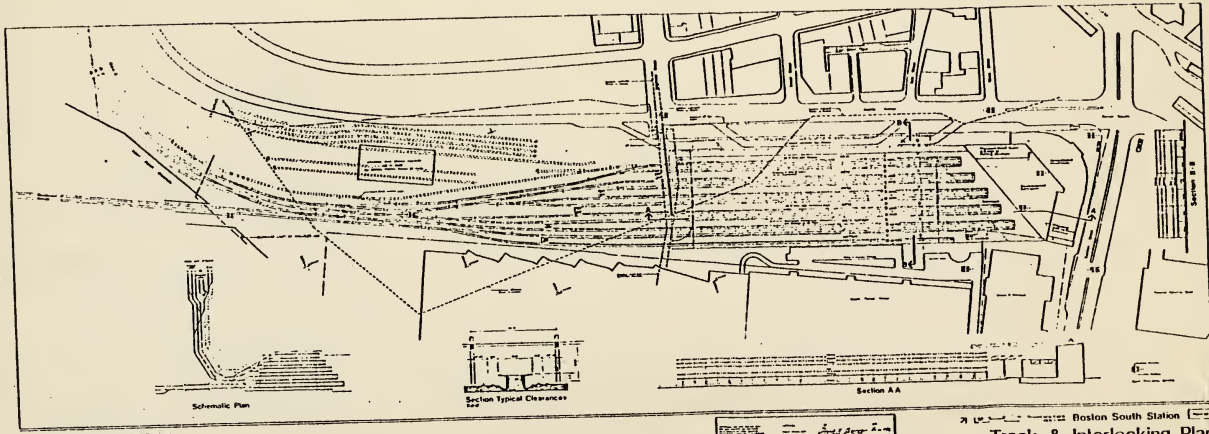
1301 CONNECTICUT AVENUE NW, WASHINGTON, D.C. 20036 (202) 462-8800

Future Development

NOV 1 1979

Boston South Station

Partial Longitudinal Section



Northeast Corridor Improvement Project

Phase 1

Track & Interlocking Plan

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3 9999 06316 017 8